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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/706,157	11/03/2000	Mario Nemirovsky	P3817	5005

24739 7590 10/03/2003

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EXAMINER	
COLEMAN, ERIC	

ART UNIT	PAPER NUMBER
2183	

DATE MAILED: 10/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/706,157	NEMIROVSKY ET AL.	
	Examiner	Art Unit	
	Eric Coleman	2183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. The scope of meaning of claim 14 is unclear because the claim does not include a period at the end of the claim.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3,5,6,8,16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubey (patent No. 5,724,565) in view of Sharangpani (patent No. 5,699,537).

3. Dubey taught the invention substantially as claimed including a data processing ("DP") system comprising:

a) Instruction source (instruction cache 110) (e.g., see fig. 1A);

b) A first cluster of a plurality of streams fetching instruction from the instruction source (e.g., see figs. 1A, 1B, col. 6 line 38-col. 7, line 55 and col. 8, lines 16-60);

b) A second cluster of a plurality of streams fetching instructions from the instruction source (e.g., see figs. 1A, 1B and col. 6, line 38-col. 7, line 55 and col. 8, lines 16-60);

c) Dedicated instruction buffers in each cluster for individual streams (e.g., see col. 7, lines 48-65 and fig.1A);

d) First dedicated dispatch stage in the first cluster for dispatching instructions to execution units (e.g., see col. 7, line 48-col. 8, lines 60);

e) Second dedicated dispatch stage in the second cluster for dispatching instructions to execution units (e.g., see col. 7, line 48-col. 8, line 60).

4. As to the limitation of the clusters operating independently with dedicated dispatch stage taking instructions only from the instruction queue in the individual cluster to which the dispatch stages are dedicated (claims 1,16), Dubey taught that each dispatcher operated independently of the other dispatchers, and in one embodiment the schedulers were split to only schedule the instructions from the corresponding dedicated dispatcher, wherein instructions were sent to the corresponding split portion of the scheduler and on to the corresponding dedicated execution units (e.g., see col. 8, lines 16-60). Also, each dispatch stage was shown (in fig. 1A) as comprising its separate instruction buffer that received instructions from the cache.

5. Dubey taught an embodiment with dispatching instructions from instruction queues (e.g., see col. 31, lines 5-24), but Dubey did not specifically detail (claim 1) that the instruction buffers that were individually dedicated to dispatchers comprised

instruction queues. Sharangpani, however taught dedicated queues for each of several dispatchers such that each dispatcher only received instructions from its dedicated queue or queues in a system that performed instructions in plural clusters (e.g., see figs. 3,4 and col. 6, lines 49-64).

6. It would have been obvious to one of ordinary skill in the DP art to combine the teachings of Dubey and Sharangpani. Both references were directed toward the problems of providing dynamic scheduling of instruction in chains of instruction using separate dispatchers. One of ordinary skill in the DP art would have been motivated to add the teachings of independent dispatch queues of Sharangpani in order to provide efficient parallel execution of independent chains of instructions with access to instructions for each dispatcher without using costly CAM-match hardware (e.g., see col. 3, lines 16-67 of Sharangpani).

7. As per claim 2, Dubey taught execution units that are dedicated for use by individual clusters in the embodiment with split schedulers (e.g., see (e.g., see col. 8, lines 16-60).

8. As per claim 3, Dubey taught separate fetching from separate ports of the cache for parallel fetching to individual threads (e.g., see col. 6, line 58-col. 7,lines 65).

9. As per claim 8, Dubey taught groups of execution units or functional units dedicated to each cluster (e.g., see col. 7, line 48-col. 8, line 60).

10. As per claim 5, Dubey taught means for fetching in each cycle, a series of instructions from the instruction source (cache) by a single cluster via a cache port dedicated to that cluster wherein in one cycle plural instructions are fetched for one

thread of a cluster and in another cycle plural instructions are fetched for another thread of the same cluster (e.g., see col. 6, line 65-col. 7, lines 1-21).

11. As per claim 6, Dubey taught monitoring fetch program counters and fetching beginning at addresses according program counters (e.g., see col. 6, line 65-col. 7, line 21).

12. Claims 4,7, are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubey in view of Sharangpani as applied to claims 1-3,5,6,8,16, above, and further in view of Tremblay (patent No. 6,343,348).

13. Tremblay taught (e.g., see fig.1) a system with eight streams executed on eight execution units and four streams per cluster (e.g., see col. 4, line 41-col. 5, line 42).

14. It would have been obvious to one of ordinary skill to combine the teachings of Dubey and Tremblay. Both systems were directed toward the problems of simultaneous independent execution of threads. One of ordinary skill would have been motivated to incorporate the Trembay teachings of indepdendent clusters using improved register file structure with each cluster included four execution units in order to take advantage of the improved access speed to register files (e.g., see col. 3, lines 8-45).

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 9-11,13,15, is rejected under 35 U.S.C. 102(b) as being anticipated by Dubey (patent No. 5,724,565).

17. Dubey taught the invention as claimed including a data processing ("DP") system comprising:

a) Instruction source (instruction cache 110) (e.g., see fig. 1A) ;

b) A first cluster of a plurality of streams fetching instruction from the instruction source in (e.g., see figs. 1A, 1B, col. 6 line 38-col. 7, line 55 and col. 8, lines 16-60);

b) A second cluster of a plurality of stream fetching instructions from the instruction source (e.g., see figs. 1A, 1B and col. 6, line 38-col. 7, line 55 and col. 8, lines 16-60);

c) Dedicated instruction buffers in each cluster for individual streams (e.g., see col. 7, lines 48-65 and fig.1A);

d) First dedicated dispatch stage in the first cluster for dispatching instructions to execution units (e.g., see col. 7, line 48-col. 8, lines 60);

e) Second dedicated dispatch stage in the second cluster for dispatching instructions to execution units (as per claims 9,15) (e.g., see col. 7, line 48-col. 8, line 60); and

f) Means for fetching in each cycle, a series of instructions from the instruction source (cache) by a single cluster via a cache port dedicated to that cluster wherein in one cycle plural instructions are fetched for one thread of a cluster and in another cycle plural instructions are fetched for another thread of the same cluster (e.g., see col. 6, line 65-col. 7, line 21).

18. As per claim 10, Dubey taught groups of execution units or functional units dedicated to each cluster (e.g., see col. 7, line 48-col. 8, line 60).

As per claim 11 Dubey taught fetch stage dedicated to individual streams (e.g., see col. 6, line 65-col. 7, line 21).

19. As per claim 13, Dubye taught fetching beginning at addresses according program counters (e.g., see col. 6, line 65-col. 7, line 21).

Claim Rejections - 35 USC § 103

20. Claims 12,14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubey as applied to claims 9-11,13,15, above, and further in view of Tremblay (patent No. 6,343,348).

21. Tremblay taught (e.g., see fig.1) a system with eight streams executed on eight execution units and four streams per cluster (e.g., see col. 4, line 41-col. 5, line 42).

22. It would have been obvious to one of ordinary skill to combine the teachings of Dubey and Tremblay. Both systems were directed toward the problems of simultaneous independent execution of threads. One of ordinary skill would have been motivated to incorporate the Trembay teachings of indepdendent clusters using improved register file structure with each cluster accessed by four execution units in order to take advantage of the improved access speed to register files (e.g., see col. 3, lines 8-45).

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Corwin (patent No. 6,378,063) disclosed a system for routing dependent instructions to clustered execution units (e.g., see abstract) and fig.2).

Joy (patent No. 6,542,991) disclosed a multiple-thread processor withsingle thread interface (e.g., see fig. 9).

Kawano (patent No. 6,141,746) disclosed an information processor means for inhibiting dispatch (e.g., see fig. 7).

Lipasti (patent No. 6,219,780) disclosed a system of dispatching instruction to multiple instruction units (e.g., see fig. 2).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Coleman whose telephone number is (703) 305-9674. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (703) 305-9712. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-305-3900.

EC

September 25, 2003

ERIC COLEMAN
PRIMARY EXAMINER